

User Manual



EOC-20/21

Ethernet over Coaxial
Master/Subscriber Pair



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EOC20/21 User Manual

Ethernet over Coaxial Master/Subscriber Pair

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Marking by the symbol CE indicates compliance of this equipment to the EMC and LVD directives of the European Community. Such marking is indicative that this equipment meets or exceeds the following technical standards: EN 55022:2006, Class A, EN55024:1998+A1:2001+A2:2003, and EN60950-1:2001

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1. Introduction

The EOC-20 is Multiplexer Unit for EoCNA (Ethernet over Coax Network Alliance) solution that efficiently extends 10/100 Ethernet circuits to over 900 meters(2,952feet) at 112Mbps using existing coaxial cable. The EOC-20 will allow Ethernet connectivity in existing facilities without pulling extra cable. This is perfect solution for hotel or Multi-Dwelling Units where existing CATV coaxial cable already exists and high-speed Ethernet communications are required for Internet and/or IPTV. The EOC-20/21 is used with Coaxial cable to extend Ethernet connectivity over existing CCD/CATV grade Coaxial cable.

1.1 Key Features

- High-Speed, up to 160Mbps communications link over existing Coaxial Cable, Asymmetrical on EoCNA
- 112Mbps@ up to 900 meters(2,952feet), reach down to 32Mbps @ about 1.2Km(4,000feet)
- Operates transparently to high layer protocols such as TCP/IP
- Auto-MDIX and Auto-sensing 10Base-T or 100Base-TX and Full or Half-Duplex on the Ethernet port
- Web based configuration or provisioning via TFTP configuration download
- Status LEDs for simple monitoring of the device and connection status

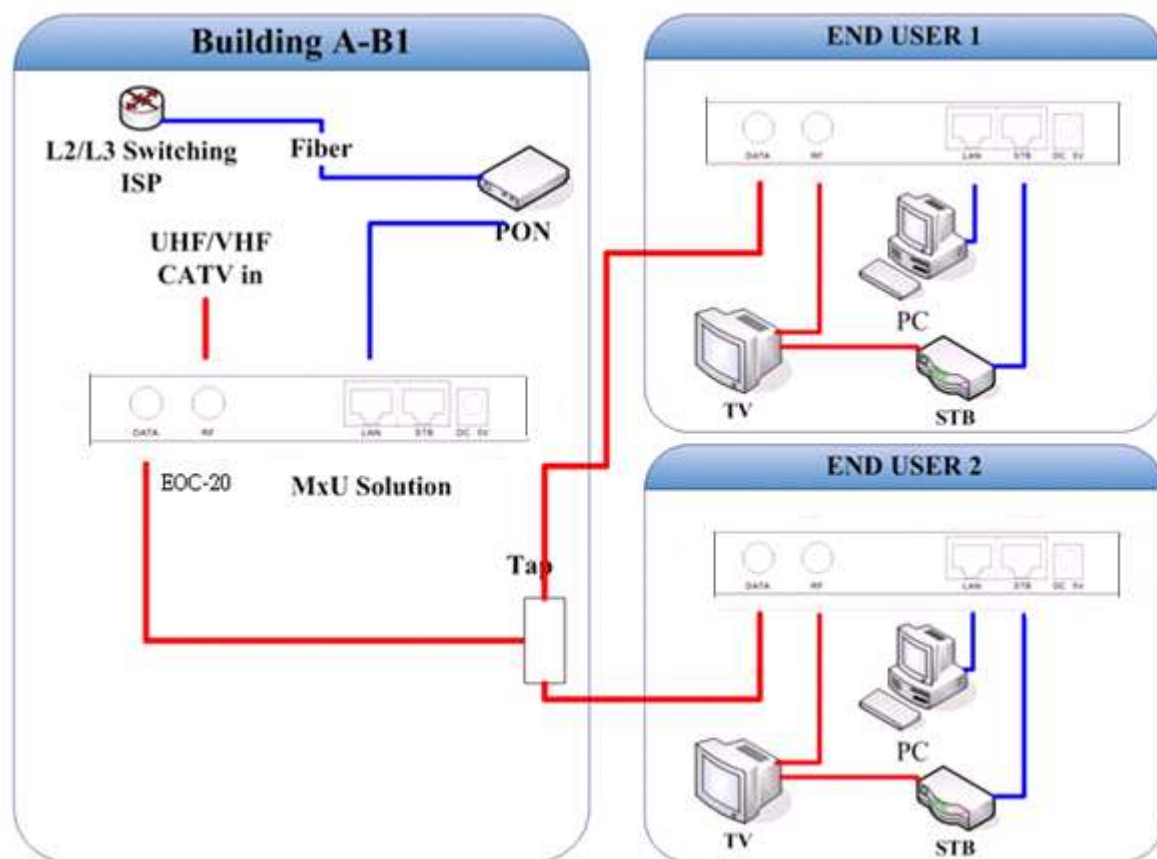
1.2 Specifications

- **Network Standards**
 - ITU G.9954 , Ethernet Over Coaxial Network (EoCNA)
 - IEEE802.3 10BASE-T, 10Mbit/s
 - IEEE802.3u 100BASE-TX, Fast Ethernet at 100Mbit/s, Auto-negotiation
 - IEEE802.3x Full Duplex and Flow Control
 - IEEE802.1Q 802.1Q tag-based VLANs
 - IEEE802.1p Multi-Priority assignment, Differential queue weight, Port-based and queue-based rate limiting
 - Multicast Applications: Supports IGMPv1/v2 snooping.
- **Protocol:**
 - Ethernet; Transparent to higher layer protocols
- **Connectors**
 - Fast Ethernet : Two RJ-45 Connectors
 - Coax : Two F-Type Female Coax Connectors, One for EoCNA trunk, the other for CATV
- **Transmission Power and Spectrum**
 - 8 +/- 1 dBm
 - 12-28 MHZ
- **Transmission Speed and Distance**
 - Up to 112Mbps@900 meters
 - Up to 4000 Feet (-176dBm/Hz Noise Floor)
- **Fast Ethernet Interface**
 - 10/100 Mbps
 - MDI/MDI-X Auto Crossover
- **Quality of Service**
 - Priority Base on IEEE802.1p and TCP/UDP port
 - Priority Base on 802.1Q Tag
 - Guaranteed QoS base on Layer II Parameterized QoS

- **Network Management**
 - Diagnostic EoCNA function
 - Secured/Isolated Communication between devices
 - Provision/Denial of Service
 - CPE profile download & SNMP read/write along with Web Manager setting
 - DHCP snooping and DHCP Option 82 support
 - NetBIOS blocking
 - ARP support
 - Public IP ACL
 - Port QoS Rate limit function for EoCNA port or LAN Port
- **Indicators**
 - "Power" LED
 - Alarm LED
 - RUN LED
 - LAN Link/Act LED, STB Link/Act LED
 - EoCNA SyncMode LED , Link/Act LED
- **Environmental Conditions**
 - Operating Temperature : 0°C ~ 50°C (32°F ~ 131°F)
 - Storage Temperature : -10°C ~ 65°C (14°F ~ 149°F)
 - Operating Humidity : 10% ~ 90% , Non-condensing
- **Power Requirement**
 - External Power Supply : 5VDC
 - Power Consumption : < 6 Watts
- **Physical Dimension**
 - 155mm(W) x 83mm(D) x 30mm(H)
- **Unit Weight**
 - 330 g
- **Emissions Compliance**
 - FCC part 15 Class B, CE Mark

1.3 Applications

- For Multi Service Operator (MSO) to deliver Triple-Play service in Last Mile solution.
- Extend LAN connectivity to a remote site or between buildings
- Connect Ethernet between different rooms over existing home Coaxial infrastructure
- Connect new controller technology on the factory floor using existing cable
- Extend Ethernet connectivity from a backbone network to an isolated location via Coaxial wire
- Transmit Video and traffic controller information over existing Coaxial wire



2. VLAN (Virtual Local Area Network)

Virtual LAN (VLAN) is defined as a group of devices on one or more LANs that are configured so that they can communicate as if they were attached to different wire, when in fact they are located on the same LAN segment. Because VLAN is based on logical instead of physical connections, it is extremely flexible.

The IEEE 802.1Q defines the operation of VLAN bridges that permit the definition, operation, and administration of VLAN topologies within a bridged LAN infrastructure. VLAN architecture benefits include:

1. Increased performance
2. Improved manageability
3. Network tuning and simplification of software configurations
4. Physical topology independence
5. Increased security options

As EOC (Ethernet over Coax) links are deployed more and more extensively and popularly, the technology embraces the implementation of VLAN (VLAN tagging and untagged) over Coaxial links and, hence, it is possible to be a requirement of ISPs.

We discuss the implementation of VLAN only for bridge mode operation, i.e., the VLAN spreads over both the CO and CPE sides, where there is no layer 3 routing involved.

2.1 Specification

1. The unit supports up to 3 active VLANs with shared VLAN learning bridge out of 4096 possible VLANs specified in IEEE 802.1Q.
2. Each port always belongs to a default VLAN with its port VID (PVID) as an untagged member. Also, a port can belong to multiple VLANs and be tagged members of these VLANs.
3. A port must not be a tagged member of its default VLAN.
4. If a non-tagged or null-VID tagged packet is received, it will be assigned with the default PVID of the ingress port.
5. If the packet is tagged with non-null VID, the VID in the tag will be used.
6. The look up process starts with VLAN look up to determine whether the VID is valid. If the VID is not valid, the packet will be dropped and its address will not be learned. If the VID is valid, the VID, destination address, and source address lookups are performed.
7. The VID and destination address lookup determines the forwarding ports. If it fails, the packet will be broadcasted to all members of the VLAN, except the ingress port.
8. Frames are sent out tagged or untagged depend on if the egress port is a tagged or untagged member of the VLAN that frames belong to.
9. If VID and source address look up fails, the source address will be learned.

2.2 Frame Specification

An untagged frame or a priority-tagged frame does not carry any identification of the VLAN to which it belongs. Such frames are classified as belonging to a particular VLAN based on parameters associated with the receiving port. Also, priority tagged frames, which, by definition, carry no VLAN identification information, are treated the same as untagged frames.

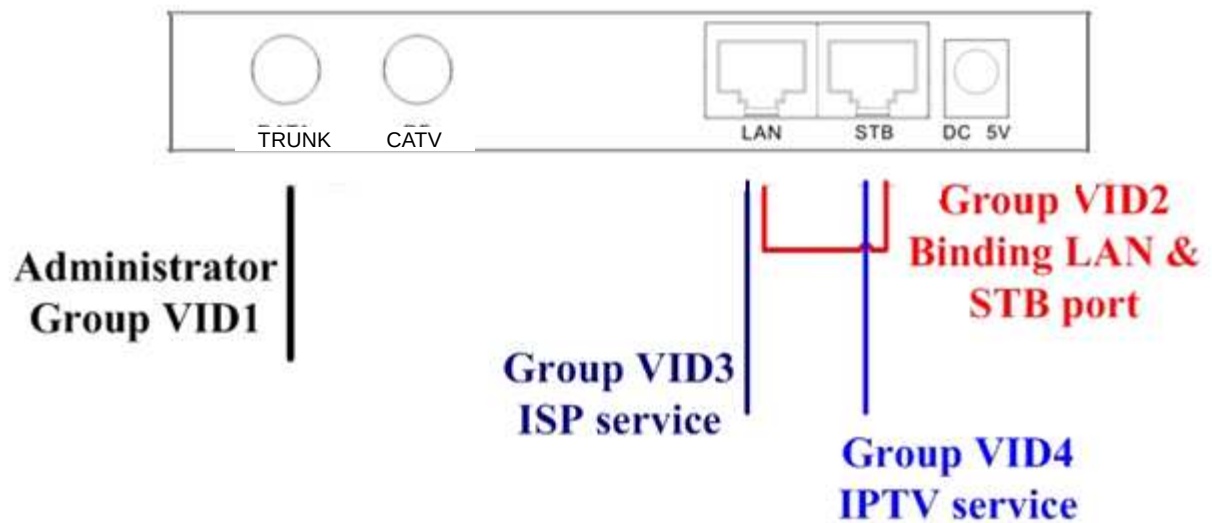
A VLAN-tagged frame carries an explicit identification of the VLAN to which it belongs; i.e., it carries a tag header that carries a non-null VID. This results in a minimum tagged frame length of 68 octets. Such a frame is classified as belonging to a particular VLAN based on the value of the VID that is included in the tag header. The presence of the tag header carrying a non-null VID means that some other device, either the originator of the frame or a VLAN-aware bridge, has mapped this frame into a VLAN and has inserted the appropriate VID.

The following figure shows the difference between a untagged frame and VLAN tagged frame, where

the Tag Protocol Identifier (TPID) is of 0x8100 and it identifies the frame as a tagged frame. The Tag Control Information (TCI) consists of the following elements:

- 1) User priority allows the tagged frame to carry user priority information across bridged LANs in which individual LAN segments may be unable to signal priority information (e.g., 802.3/Ethernet segments).
- 2) The Canonical Format Indicator (CFI) is used to signal the presence or absence of a Routing Information Field (RIF) field, and, in combination with the Non-canonical Format Indicator (NCFI) carried in the RIF, to signal the bit order of address information carried in the encapsulated frame.
- 3) The VID uniquely identifies the VLAN to which the frame belongs.

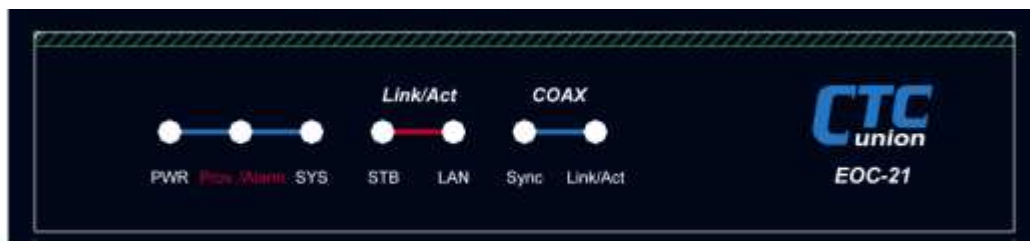
2.3 Application



3. Getting to Know Your EOC Modem

This section will introduction the hardware of the EOC modem.

3.1 Front Panel



3.1 Front Panel

LED	Status		
	On	Off	Flashing
Power	DC 5V power feeding in	Not powered	N/A
Prov./Alm.	Provision download/Alarm	CPE configuration file download	Normal Operation
Run	CPE Processor running	CPU running	
Link/Act	STB Link	Disconnected or Link failed	Received or Transmit
Link/Act	LAN Link	Disconnected or Link failed	Received or Transmit
COAX	ECO Synchronous Mode	Async. Mode	N/A
COAX	EOC Link	Disconnected or Link failed	Received or Transmit

3.2 Rear Panel



3.2 Rear Panel

Port Name	Type	Functions
DC IN	DC	Connect to the power adapter plug.
LAN	RJ-45	Connects to Ethernet port on PC or STB LAN port
RESET	RESET	RESET button to load factory default
CATV	F-Type Female Coax	Connect to TV or DVB-T/C Received signal
TRUNK	F-Type Female Coax	Connects from trunk of other EoC unit.

4. Configuration of the EOC Modem

This guide is designed to lead users through Web Configuration of EOC Modem in the easiest and quickest way possible. Please follow the instructions carefully.

Note: There are three methods to configure the EOC Modem: Provision deliver (via TFTP), Telnet and Web Browser. Only one configuration application is used to setup the EOC Modem at any given time. Users have to choose one method to configure it. For Web configuration, you can skip step 3. For Provision Configuration, you can skip step 1 and 2.

4.1 Step 1: Check the Ethernet Adapter in PC or NB

Make sure that Ethernet Adapter had been installed in PC or NB used for configuration of the EOC Modem. TCP/IP protocol is necessary for web configuration, so please check the TCP/IP protocol whether it has been installed.

4.2 Step 2: Check the Web Browser in PC or NB

According to the Web Configuration, the PC or NB need to install Web Browser, IE or Netscape.

Note: Suggest to use IE5.0, Netscape 6.0 or above and 800x600 resolutions or above.

4.3 Step 3: Check the TFTP Server Program

For Provision deliver profile setting Configuration, users need to setup the TFP server program (FTP/HTTP Server) .

4.4 Step 4: Determine Connection Setting

Operator need to know the Internet Protocol supplied by your Service Provider and determine the mode of setting.

The different Protocols need to setup different WAN parameters. Once knowing the Protocol provided by ISP, you have to ask the necessary WAN parameters to setup.

4.5 Step 5: Install the EOC Modem

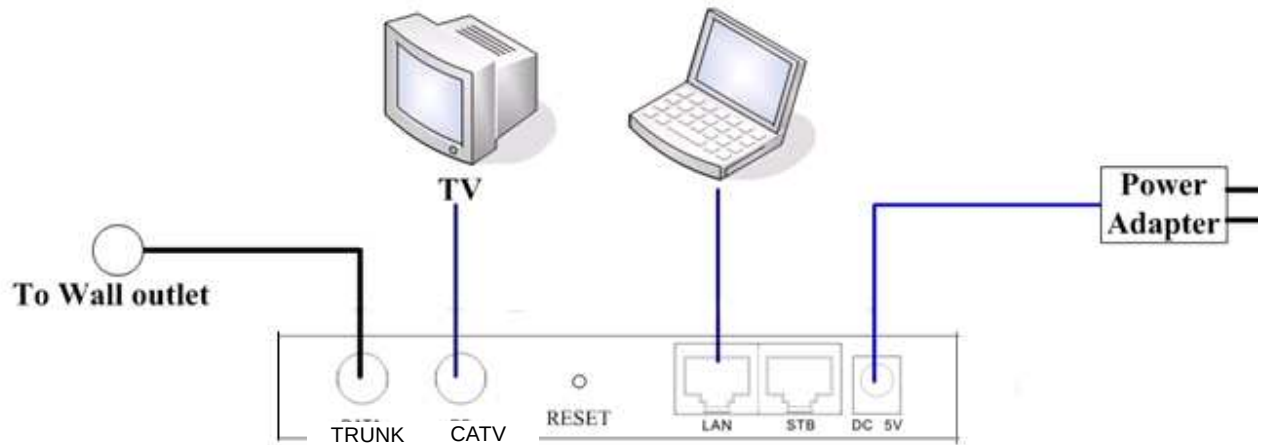
! To avoid possible damage to EOC Modem, do not turn on the EOC Modem before Hardware Installation.

- ☐ Connect the power adapter to the port labeled DC-IN on the rear panel of the product.
- ☐ Connect the Ethernet cable.

Note: The 2-port EOC Modem both supports auto-MDIX switching hub so both straight through and cross-over Ethernet cable can be used.

- ☐ Connect the Coaxial cable to the product Trunk port and the other side of Coaxial cable to wall jack.
- ☐ Connect the power adapter to power source.
- ☐ Turn on the PC or NB, which is used for configuration the EOC Modem.

5. Configuration Via Web Browser



Step. 1 For Win85, 98 and Me, click the **start** button.

Select **setting** and **control panel**.

Step. 2 Double click the **network** icon.

In the Configuration window, select the **TCP/IP** protocol line that has been associated with your network card and then click **properties** icon. Choose IP address tab. Select **Use the following IP address**. Enter the IP Address is 192.168.8.10 Subnet mask 255.255.255.0 Click **OK** button. The window will ask you to restart the PC. Click **Yes** button.

After rebooting your PC, open IE or Netscape Browser to connect to the EOC. Type

<http://192.168.8.254>

The screenshot shows the login page of the EOC Modem web interface. It has a dark background with a light-colored sidebar on the left. The sidebar contains the following text: "Login ID :", "Password :", and a "Login" button. The main area of the page is empty.

The default LAN IP address and sub net-mask of the EOC modem is 192.168.8.254 and 255.255.255.0.

Type User Name **admin** and Password **1111** and then click OK.

The default user name and password both are *admin*. For system security, it is suggested to change them after configuration.

Note: After changing the User Name and Password, we strongly recommend you to remember them for the next time you login.

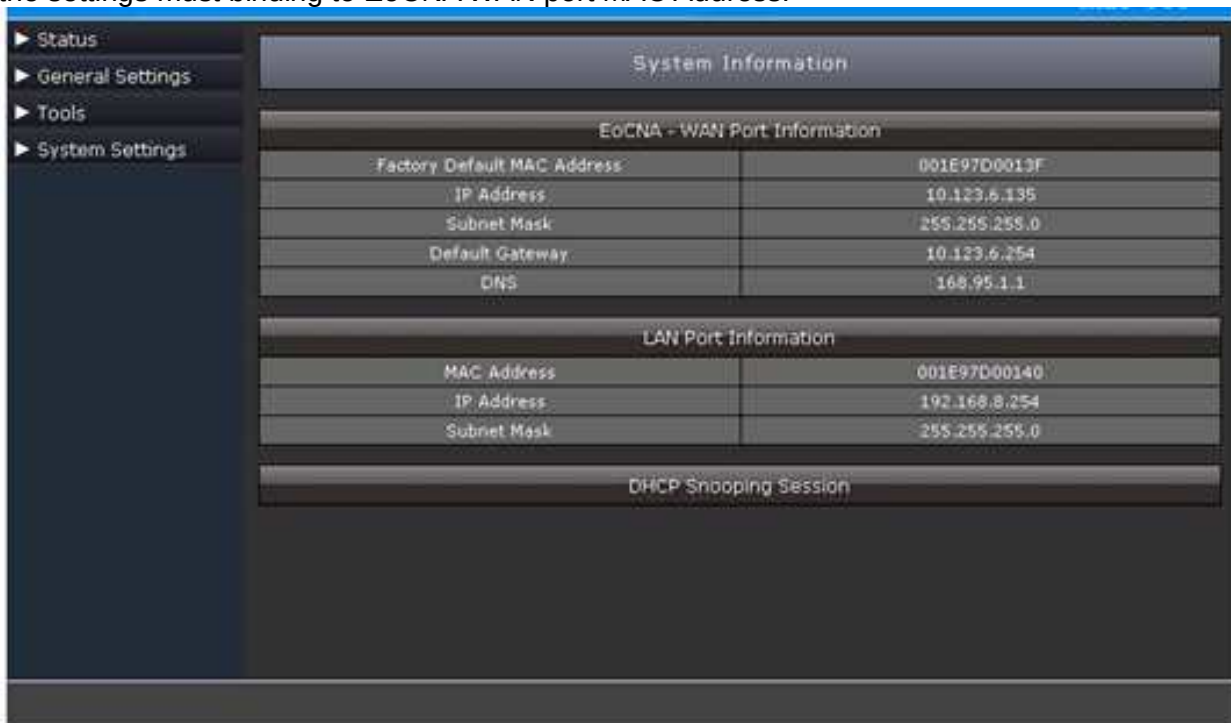
6. Status

After login click Status button. You will see the EOC System Information.

System Information Includes

- EOC WAN port information, WAN MAC Address, CPE WAN IP, CPE Subnet Mask, CPE Gateway, CPE DNS setting etc.
- LAN port information, LAN MAC Address, CPE LAN IP and Subnet Mask
- DHCP Snooping session, In some ISP operator , will assign customer get several DHCP IP. This means CPE can snooping customer current IP and future function.

Note. If need to configure CPE IP through DHCP server, even Provisioning, please make sure all the settings must binding to EoCNA WAN port MAC Address.



System Information	
EoCNA - WAN Port Information	
Factory Default MAC Address	001E97D0013F
IP Address	10.123.6.135
Subnet Mask	255.255.255.0
Default Gateway	10.123.6.254
DNS	168.95.1.1
LAN Port Information	
MAC Address	001E97D00140
IP Address	192.168.8.254
Subnet Mask	255.255.255.0
DHCP Snooping Session	

7. General Settings

In this section will finger out CPE of general settings. Please reference follow as.



The General Settings contains EoCNA-WAN, LAN, SNMP, Provision Settings sub-option. Operator can use it to completely setup the EOC Modem. After successfully completing it, User can access Internet. This is the easiest and possible way to setup the EOC Modem.

7.1 EoCNA-WAN Setup

EoCNA-WAN status

At the EoCNA-WAN Web page setting, can finger out the Current EoCNA – WAN IP

Address , exp. 10.123.6.135

EoCNA-WAN IP setting

EOC Modem had four way can setting to connect to ISP(Operation and Maintain Using)

DHCP, Static IP, PPPoE, PPTP.

EoCNA DNS setting

DNS setting can setup bye default or manual.

EoCNA WAN QoS setting

After enable QoS function, can assign Downstream/Upstream by default 128K,256K,512K,1M,2M,4M,8M,16M,32M or Manual setting.

EoCNA VLAN setting

After enable VLAN tagging, will insert 4 Bytes for 802.1Q tagging and untagged. In the same time also can setting separate or combine Port VID and Priority.

Note.

- Disable QoS in Manager Mode, EOC throughput is 32M/32M
- Disable QoS in Wire-Speed Mode, EOC throughput is 100M/100M
- Enable QoS in Manager Mode, EOC can manager from 64K-32768K(Downstream)/64K-8192K(Upstream)

► Status	EoCNA - WAN	
▼ General Settings	Current EoCNA - WAN IP Address: 10.123.6.135	
EoCNA - WAN		
LAN	DHCP ☒	Hostname
SNMP		Vendor Class ID
Provision Settings		Mtu 1500
► Tools	Static IP ☒	IP address 10.123.6.135
► System Settings		Subnet mask 255.255.255.0
		Default Gateway IP 10.123.6.254
		Mtu 1500
	PPPoE ☒	PPPoE Account
		PPPoE Password *****
		Confirm Password *****
		Mtu 1492
	PPTP ☒	IP address
		Subnet mask
		Default Gateway IP (Optional)
		PPTP Server
		PPTP ID
		PPTP Password *****
		Confirm Password *****
		Mtu 1452

Domain Name Server Assignment		☒ Auto ☐ Manual
Domain Name Server (Primary) IP		168.95.1.1
Domain Name Server (Secondary) IP		
WAN QoS		
QoS ☒	Downstream Bandwidth	Manual [64 - 32768 kbps] 20480 kbps
	Upstream Bandwidth	Manual [64 - 8192 kbps] 4096 kbps
VLAN		
Enable VLAN Tagging	☐	
	VLAN ID [1 - 4094]	Priority [0 - 7]
Administration Traffic	4000	7
SetTopBox Traffic	3	5
LAN Traffic	1	0
Accept Reset Default		

7.2 LAN Setup

In the LAN section, follow these functions.

LAN default Setting

Default EOC Modem LAN IP is 192.168.8.254 and Subnet mask is 255.255.255.0

LAN QoS Setting

If enabling LAN QoS, can set STB/LAN port Priority Flow Control, Incoming/Outgoing Rate Limit

EoC Function Setting

EoC Operation Mode: default is Manager Mode. Wire-Speed Mode only works for Testing best effective throughput.

IGMP Snooping enable: IGMP Snooping is the process of listening to IGMP traffic. IGMP snooping, as implied by the name, is a feature that allows the EOC Modem to "listen in" on the IGMP conversation between hosts and routers by processing the layer3 IGMP packets sent in a multicast network

DHCP Snooping enable: DHCP snooping performs two main tasks:

- Keeping a record of which IP address are currently allocated to hosts downstream of the ports on the EOC Modem.
- Deciding which packets are candidates for having Option 82 information inserted, and actively filtering out packets that are deemed to be invalid DHCP packets.

NetBIOS blocking enable: Blocking SMB protocol, exp. TCP/UDP 137-139, UDP 445

Maximum DHCP session manager: Counting final DHCP ACK, and check to half Least Time alive?

DHCP Option 82 enable: DHCP Relay Agent Information Option 82 is an extension to the Dynamic Host Configuration Protocol (DHCP), and is defined in RFC 3046.

▶ Status
▼ General Settings
EoCNA - WAN
LAN
SNMP
Provision Settings
▶ Tools
▶ System Settings

LAN

LAN

LAN IP / LAN default Gateway192.168.8.254Subnet mask255.255.255.0

LAN QoS

Enable LAN QoS	☐			
Port	Priority	Flow Control	Incoming Rate Limit	Outgoing Rate Limit
STB	LOW	☒	Full	Full
LAN	LOW	☒	Full	Full

EoC Function

EoC Operation Mode
Wire-Speed Mode
Manager Mode

Enable IGMP Snooping☒

Enable DHCP Snooping☒

Maximum DHCP Session3(0 - 10 , 0 : Unlimit)

Enable DHCP Option 82☒

Enable NetBIOS Blocking☒

AcceptResetDefault

7.3 SNMP Setup

SNMP setting is for MIB Browser manager, exp.get, set, trap etc.

▶ Status
▼ General Settings
EoCNA - WAN
LAN
SNMP
Provision Settings
▶ Tools
▶ System Settings

SNMP

Enable SNMP Agent☒

Get Communitypublic

Set Communityprivate

Trap Communitypublic

Trap Host10.132.6.99

AcceptResetDefault

7.4 Provisioning Settings

Provision Setting function is design for EOC Modem profile delivery method. This is the easiest way let each CPE Modems automatic download profile setting from MSO that wants to design for “no configuration required” delivery and maintenance for CPE setting, dynamic service start up, FW upgrade, and Performance Monitoring.

Note.

- Provision during DHCP ACK “assign Boot file name”
- Provision during System Start up.
- Auto Provision by CPE itself.

Provision Settings	
Enable Auto Provisioning	☒
Profile URL provided by DHCP server	☐
Profile URL :	tftp://10.123.6.99/%mac%.Profile
Connect Provision Server During Start Up	☒
Connect Provision Server Periodically	☒
Auto Provision Interval	10800 [60 - 604800 s]
Random Offset	600 [0 - 1800 s]
Provision Retry Times [0=always, 1 - 99]	10
Retry Interval	30 [30 - 120 s]
Suspend Call Service	☐

Accept Reset Default

8. Tools

In this section, the only function is "Ping Test". CPE can execute ping testing to make sure circuit is alive.

Ping Test	
Ping Destination	10.123.6.99
Number of Ping	4 [1 - 100]
Ping Packet Size	56 [56 - 5600 bytes]

Test Stop

```

PING 10.123.6.99 (10.123.6.99): 56 data bytes
64 bytes from 10.123.6.99: icmp_seq=0 ttl=128 time=0.0 ms
64 bytes from 10.123.6.99: icmp_seq=1 ttl=128 time=0.0 ms
64 bytes from 10.123.6.99: icmp_seq=2 ttl=128 time=0.0 ms
64 bytes from 10.123.6.99: icmp_seq=3 ttl=128 time=0.0 ms

--- 10.123.6.99 ping statistics ---
4 packets transmitted, 4 packets received, 0% packet loss
round-trip min/avg/max = 0.0/0.0/0.0 ms
  
```

9. System Settings

System setting has the following pull down functions:

- System Settings
 - NTP
 - Language
 - Login Account
 - Backup / Restore
 - System Log
 - System Operation
 - Software Upgrade
 - Logout

9.1 NTP Settings:

The Network Time Protocol (NTP) is a protocol for distributing the universal time (UTC) by means of synchronizing the clocks of EOC Modem systems over packet-switched, variable-latency data networks

The screenshot shows the NTP configuration page. On the left is a sidebar menu with options: Status, General Settings, Tools, System Settings (expanded), NTP (selected), Language, Login Account, Backup / Restore, System Log, System Operation, Software Upgrade, and Logout. The main content area is titled 'NTP' and contains a table for Gateway Time and Time Zone, and a table for Time Servers. At the bottom are 'Accept', 'Reset', and 'Default' buttons.

	Year	Month	Day	Hour	Minute	Second
Gateway Time	2008	8	3	14	47	03

Time Zone	
+ 0 : 00	

#	Time Server
1	stdtime.sinica.edu.tw
2	clock.via.net
3	10.123.6.99

Accept Reset Default

9.2 Language Settings:

The Web GUI interface language can be changed by the operator. Currently there are three languages available; English, Traditional Chinese, and Simplified Chinese.

The screenshot shows the Language configuration page. The sidebar menu is the same as in the NTP settings page, with 'Language' selected under 'System Settings'. The main content area is titled 'Language' and contains a 'Web UI / IVR Language' dropdown menu set to 'English'. At the bottom are 'Accept' and 'Reset' buttons.

Web UI / IVR Language: English

Accept Reset

9.3 Login Account

Setting the Web/Telnet Login in Account name and password, even Web Listen Port.

The screenshot shows the Login Account configuration page. The sidebar menu is the same as in the previous screenshots, with 'Login Account' selected under 'System Settings'. The main content area is titled 'Login Account' and contains fields for Administrator's Name, Password, and Confirm Password, as well as checkboxes for enabling Web UI and Telnet Service. At the bottom are 'Accept', 'Reset', and 'Default' buttons.

Administrator's Name: Admin

Administrator's Password: [masked] Confirm Password: [masked]

Port of Web Access from WAN: 80 [0 = disable, 1 - 65535]

Web UI auto logout: 180 [30 - 3600 s]

Enable Web UI: ☒

Enable Telnet Service: ☒

Accept Reset Default

9.4 Backup /Restore

Backup EOC Modem configuration to a file. Restore from default configurations or backup configuration file.

The screenshot shows the 'Backup / Restore' page in a web interface. On the left is a sidebar menu with options: Status, General Settings, Tools, System Settings (expanded), NTP, Language, Login Account, Backup / Restore (selected), System Log, System Operation, Software Upgrade, and Logout. The main content area has a title bar 'Backup / Restore'. Below it, there are two sections: 'Backup Configurations' and 'Restore Configurations'. In 'Backup Configurations', there are two rows: 'Configuration File' with a 'Backup' button, and 'Configuration Template File' with a 'Backup' button. In 'Restore Configurations', there are two rows: 'Upload Configuration File' with a radio button selected, a text input field, and a '浏览...' (Browse...) button; and 'Restore Default Configurations' with a radio button. At the bottom of the 'Restore Configurations' section is a 'Restore' button.

9.5 System Log

Setting Remote site Log Server Address and port. This service lets CPE upload the system log to a Log Server.

The screenshot shows the 'System Log' page in a web interface. On the left is a sidebar menu with options: Status, General Settings, Tools, System Settings (expanded), NTP, Language, Login Account, Backup / Restore, System Log (selected), System Operation, Software Upgrade, and Logout. The main content area has a title bar 'System Log'. Below it, there are three rows: 'Enable' with a checked checkbox, 'Server Address' with a text input field containing '10.123.6.99', and 'Port' with a text input field containing '514' and a range indicator '[1 - 65535]'. At the bottom of the form are three buttons: 'Accept', 'Reset', and 'Default'.

9.6 System Operation

Some EOC Modem parameters must EOC Modem save and restart can be apply. That mean every change of setting ,we recommend to execute this section function.

The screenshot shows the 'System Operation' page in a web interface. On the left is a sidebar menu with options: Status, General Settings, Tools, System Settings (expanded), NTP, Language, Login Account, Backup / Restore, System Log, System Operation (selected), Software Upgrade, and Logout. The main content area has a title bar 'System Operation'. Below it, there is a red warning message: 'Be sure to save all settings before restart.'. There are two rows: 'Save Settings' with a checkbox and the description 'Save all configurations.', and 'Restart' with a checkbox and the description 'Restart the Gateway right away. All calls will be DROPPED when Restart.'. At the bottom of the form is an 'Accept' button.

9.7 Software Upgrade

EOC Modem provide three way to remote upgrade method.

The screenshot shows the 'Software Upgrade' page of the EOC Modem web interface. On the left is a navigation menu with the following items: Status, General Settings, Tools, System Settings (expanded), NTP, Language, Login Account, Backup / Restore, System Log, System Operation, Software Upgrade (highlighted), and Logout. The main content area has a title bar 'Software Upgrade'. Below it, a message says 'To Save Current Settings, [Save Settings](#)'. The current version is 'Current Version 1.2.38.27-89-401'. The upgrade server settings are as follows:

Upgrade Server	☒ TFTP ☐ FTP ☐ HTTP
Server IP Address	10.123.6.99
Server Port	69 [1 - 65535]
User Name	
Password	*****
Directory	

Below the table, it says 'BootLoader Upgrade, Current Version 0.20.30.0'. At the bottom, a warning states 'All calls will be DROPPED during upgrade.' with an 'Accept' button.

9.8 Logout

The screenshot shows the 'Logout' page of the EOC Modem web interface. The left navigation menu is identical to the previous screenshot, with 'Logout' highlighted. The main content area has a title bar 'Logout'. Below it, a message says 'To save settings, click [Here](#)'. At the bottom, there is an 'Accept' button.

10. EOC Design For Coaxial

10.1 Rate vs. Attenuation rule of thumb

The expected rate between Master to Slave stations is determined by various elements:

- . Transmission power
- . Total attenuation between transmitter and receiver
- . Noise floor at the receiver
- . ISI of channel (Inter Symbol Interference -> Multi Channel System)

In general, the frequency response of the coax network components is nearly flat in the EoCNA band (in some cases the specified frequency range of the components is not suited for EoCNA and their behavior in the EoCNA band should be measured empirically). If the frequency response of the channel is assumed to be flat, the ISI term vanishes and the effect of the channel is reduced to attenuation. Assuming that the receiver's internal noise is the dominant noise and knowing the transmission power, it is possible to estimate the expected line rate between two stations according to the "link budget" – the sum of all attenuations in the signal path. Table 1 lists the measured line rate for varying attenuation values for Coax

MUX Coax application (RG59)	
Path attenuation [dB]	Line Rate [Mb/s]
0-8	128
9-16	128
17-46	128
47-51	112
52-54	96
55-59	80
60-62	64
63	No connectivity

Table 1: Rate vs. Attenuation for Coax

- a.) Recommend Each Master to CPE Modem attenuation range be less than 52dB.
b.) RG 59@20°C operation @30MHz , Common Cable loss reference is 4.954dB/100 meters

10.2. CATV Transmission Amplifiers

Amplifiers often do not include EoCNA in their downstream band. In cases where this type of device is installed, it should be replaced with one that has a bypass in the EoCNA band. Bypass is done by connecting a low pass filter (LPF) with a cutoff frequency of 45MHz in parallel with the amplifier as shown in Figure 1 (a). Note that in the cases where the amplifier has amplification for both downstream (DS) and upstream (US) directions (i.e. for the return channel, as shown in Figure 1 (b)), it would have overlapping bands with the LPF used for bypass and undesired effects such as positive feedback might occur in which case the amplifier should be replaced.

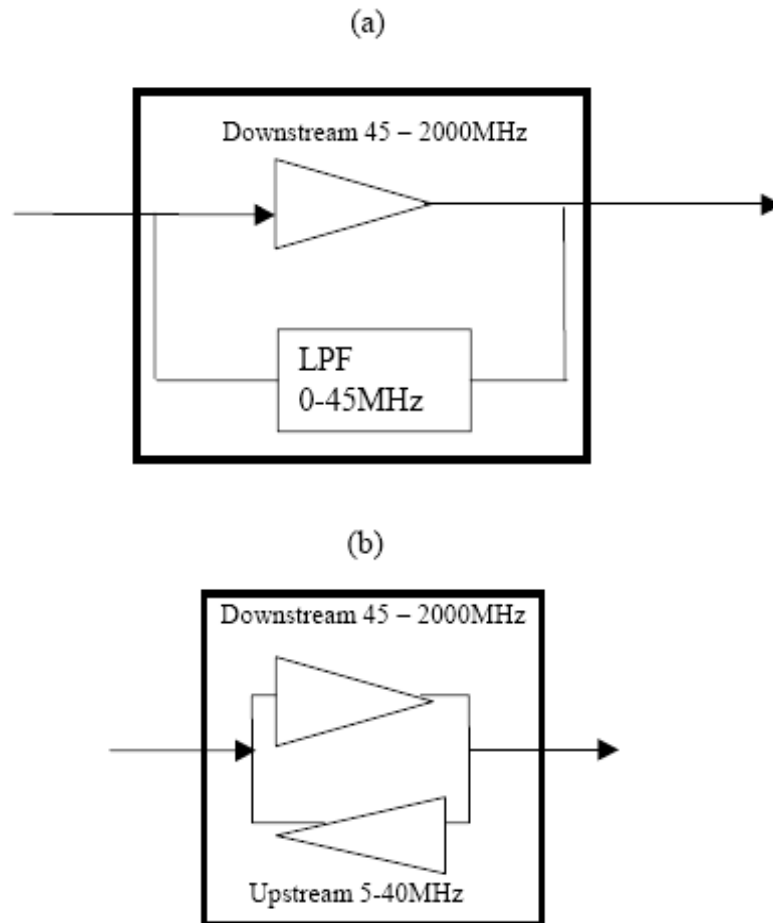


Figure 1: (a) Bypass of amplifier. (b) Bidirectional amplifier.

10.3. Connecting an EoCNA device to the Coax network

10.3.1 Cable video signal

If there is a cable video CATV signal in the network, both the TV and EoCNA devices should be connected to the TV connector of the wall outlet. In this case a simple installation should be used as shown in Figure 2. The diplexer routes the 12-28/44MHz band to the EoCNA AFE and routes the 50MHz and higher band to the TV .

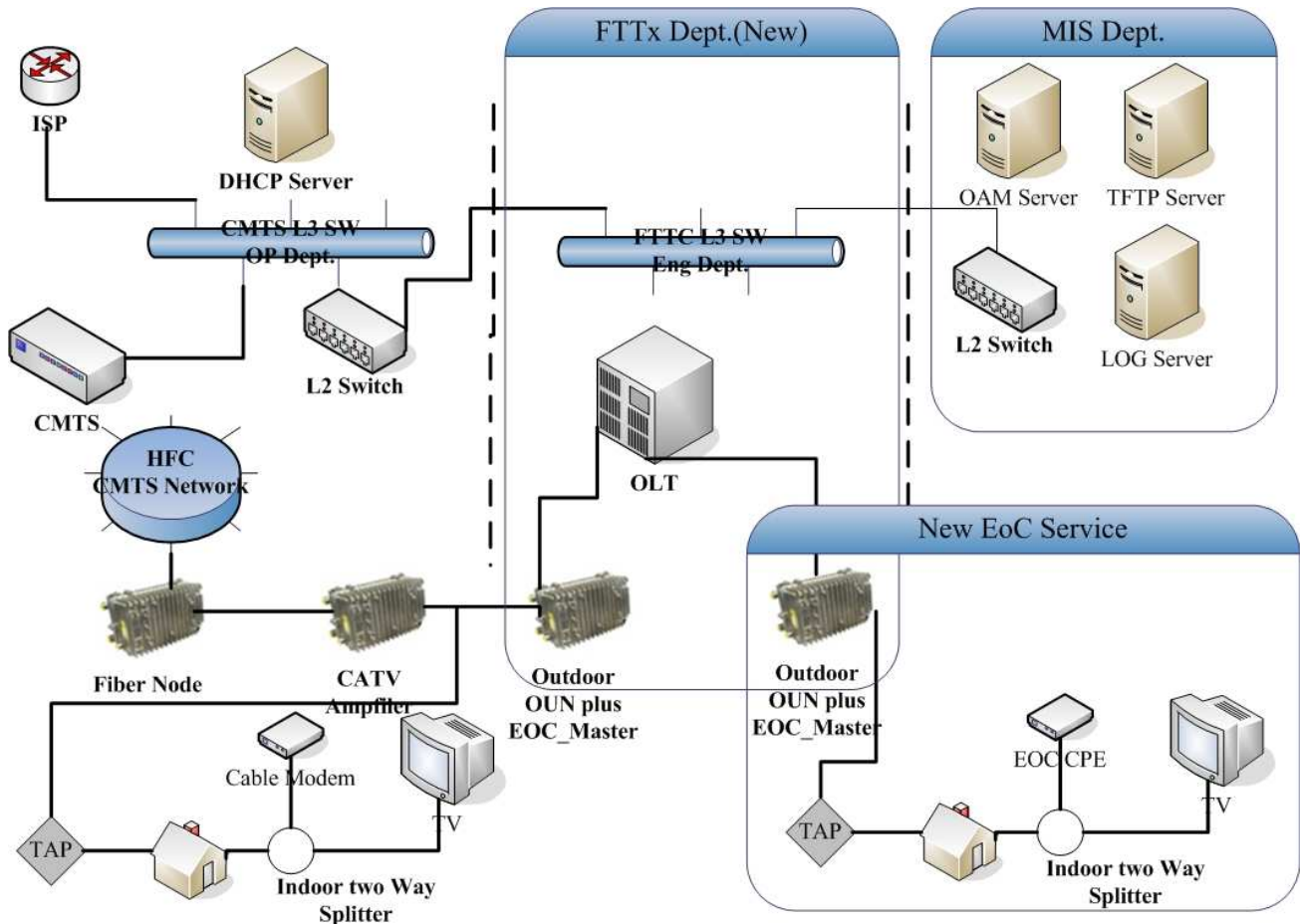


Figure 2 EOC HFC plus EOC Network

10.4. Installation Guide Lines

10.4.1 Placement of Master

In home networking applications all nodes on the network must be able to communicate with each other. In this implementation the Master device can be placed anywhere in the network. Typically the Master is located at the RG, ONT, etc.

10.4.2 Isolator

An Isolator is required at the entrance point to the apartment (the root of the coax distribution tree). The Isolator serves 2 purposes:

- To block the EoCNA signal from spreading outside the apartment to avoid security and privacy issues.
- To reduce the isolation between splitter outputs and thus increase the connectivity coverage between stations connected to the network. The isolator introduces mismatched impedance at the splitter's input which causes the isolation between outputs to be reduced by about 10dB or more. The mismatching is done only in the EoCNA band and is effective only for the splitter topology.

There are some installations where the apartment uses two ports of an outdoor tap (or splitter), as seen in Figure 1. In this case, installation should be as in Figure 2 and an isolator and a 1:2 splitter should be added between the tap port and the apartment. Note that the 1:2 splitter in this installation reduces the Coax video signal by about 3dB.

a.) Recommend using TAP to install EoCNA modem.

10.5. Physical Connection

The examples in Figure 2 are given for a CATV signal in the network.

10.5.1. MUX Access over Coax Cables

Application Name:	MUX access on coax cables
HW Configuration:	Coax
Physical Interface:	Coax
Transmission Power [dBm]	8 +/- 1dbm
Dynamic Range [dB]:	(see Table 1)
Collision detection:	Disabled
MAC mode:	Synchronous
Transmission Mask Type:	Flat
CATV to EoCNA Insertion Loss[Master]:	0.5 dB +/- 0.5dB
EoCNA to TV Insertion Loss[CPE]:	0.5 dB +/- 0.5dB

Table 2: Specifications of MUX access over coax application

10.5.2. Topologies

The topology is assumed to be MxU access over a coax distribution topology in a building (see Figure 3). The MxU access refers to the coaxial distribution cables originating from the MxU wiring cabinet which may be located in the basement and spreading up the riser through the floors of the building to the apartments.

Connectivity is between the Master and Endpoints. Networking capability is not provided between Endpoints.

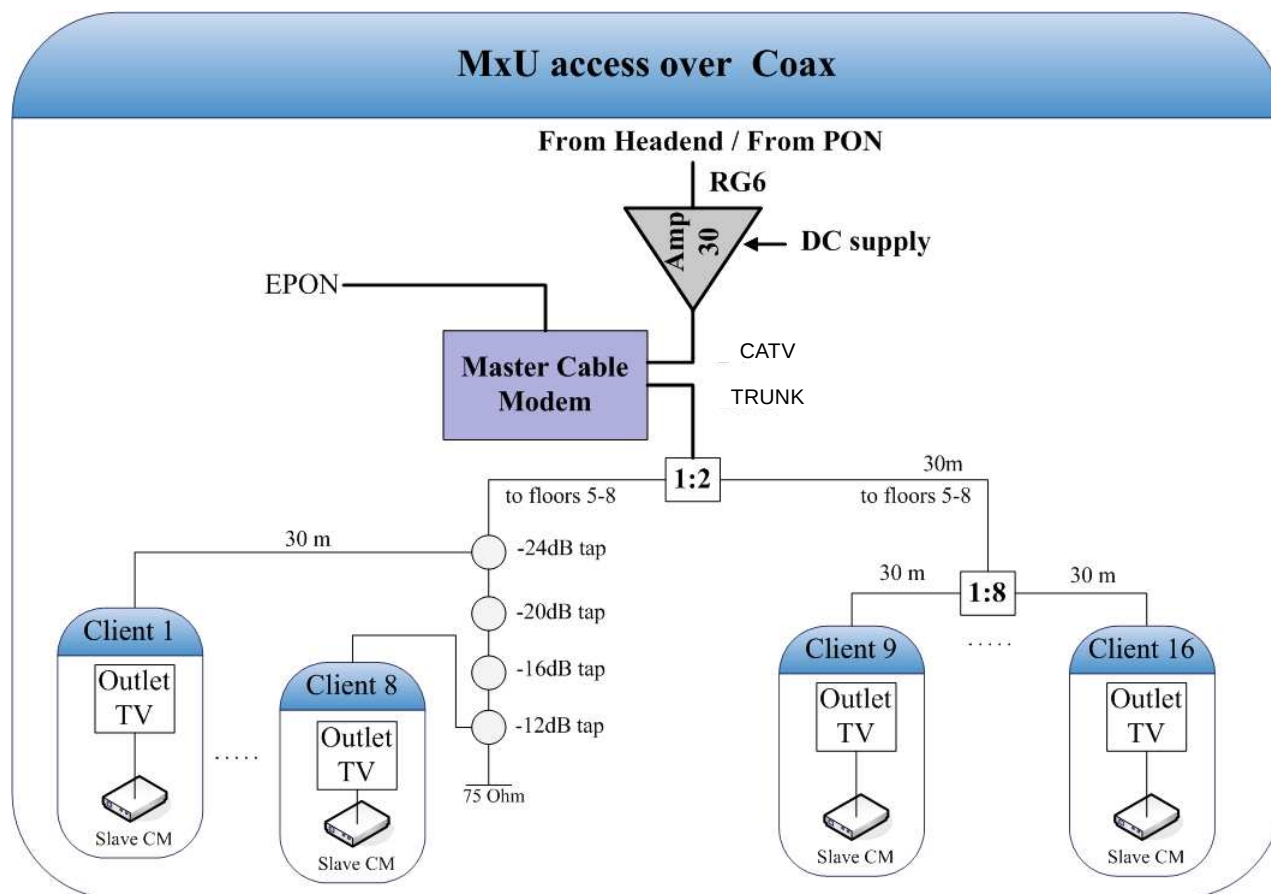


Figure 3: MUX access over Coax installation

11. Configuration Via TFTP Provisioning

EOC Modem supports plain text configuration file under TFTP service.

For MAC.profile sample.

```
=====Network Configurations - EOC WAN interface=====
#WAN type - (0:Static IP 1:PPPoE 2:DHCP)
# WAN DHCP IP example.
```

```
=====
#WAN Static IP example.
NET WAN IP_TYPE 0
NET WAN STATIC IP 10.123.6.135
NET WAN STATIC MASK 255.255.255.0
NET WAN STATIC DEFAULT_GATEWAY 10.123.6.254
```

```
=====
#WAN QoS Example (bandwidth/kbps)
QOS WAN_QOS ENABLE 1
# download from 64-32768,
QOS WAN_QOS DOWNLOAD_BANDWIDTH -1
QOS WAN_QOS DOWNLOAD_BANDWIDTH_ADV 20480
# upload from 64-8192,
QOS WAN_QOS UPLOAD_BANDWIDTH -1
QOS WAN_QOS UPLOAD_BANDWIDTH_ADV 4096
=====
```

```
QOS VLAN VLAN_ENABLE 0
# VLAN ID 0 = WAN Administrator PORT
QOS VLAN ID 0 4000
QOS VLAN PRIORITY 0 7
# VLAN ID 1 = STB PORT
QOS VLAN ID 1 3
QOS VLAN PRIORITY 1 5
# VLAN ID 2 = LAN PORT
QOS VLAN ID 2 1
QOS VLAN PRIORITY 2 0
```

```
=====Network Configurations - EOC LAN interface=====
```

```
NET LAN IP 192.168.8.254
NET LAN MASK 255.255.255.0
NET LAN ENABLE_WIRE_SPEED_MODE 0
NET LAN ENABLE_IGMP_SNOOPING 1
NET LAN ENABLE_DHCP_SNOOPING 1
NET LAN MAXIMUM_DHCP_SESSION 3
NET LAN ENABLE_DHCP_OPTION_82 1
NET LAN ENABLE_NETBIOS_BLOCKING 1
```

```
QOS LAN_QOS ENABLE 0
# QOS LAN_QOS QOS [STB:0 LAN 1] [Prio (0:High 1:Low)] [Flow(0:OFF 1:ON)] [InRate128、256、512、1024、
2048、4096、8192、16384、32768] [OutRate]
# Exp. QOS LAN_QOS QOS 0 1 1 0 0 #define STB high prio and bw unlimit
QOS LAN_QOS QOS 0 0 1 0 0
QOS LAN_QOS QOS 1 0 1 0 0
```

```
=====WEB UI Configurations=====
ADVANCED LOGIN ID Admin
ADVANCED LOGIN PASSWORD 1111
NET WAN HTTP_PORT 80
NET WAN ENABLE_WEB 1
NET WAN ENABLE_TELNET 1
ADVANCED LOGIN AUTO_LOGOUT_TIME 180
```

```
#LANGUAGELANGUAGE (Language (0:English 1:Tranditional Chinese 2:Simplified Chinese)
# LANGUAGE 1
```

```
=====TIME SERVER=====
#TIME SERVER [0-2] "Servername"
TIME SERVER 0 stdtime.sinica.edu.tw
TIME SERVER 1 clock.via.net
#TIME SERVER 2 ntp1.nl.net
TIME SERVER 2 10.123.6.99
# TIME_ZONE 0-1440 min
TIME_ZONE 0
```

```
#=====AUTO PROVISION=====
AUTO_PROVISION ENABLE 1
AUTO_PROVISION USES_DHCP_BOOTP_PROFILE 0
AUTO_PROVISION SERVER_IP tftp://10.123.6.99/%mac%.Profile
AUTO_PROVISION START_RUN 1
AUTO_PROVISION PERIODICALLY 1
AUTO_PROVISION PERIOD_TIME 10800

#=====SNMP=====
SNMP ENABLE 1
SNMP GET_COMMUNITY public
SNMP SET_COMMUNITY private
SNMP TRAP_COMMUNITY public
SNMP TRAP_HOST 10.132.6.99

#=====Log Server=====
SYSLOG ENABLE 1
SYSLOG SERVER_ADDR 10.123.6.99
SYSLOG SERVER_PORT 514
```




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